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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/586,849	07/20/2006	Hisayuki Miki	Q79703	3462
23373 7590 04/02/2008 SUGHRUE MION, PLLC 2100 PENNSYLVANIA AVENUE, N.W. SUITE 800 WASHINGTON, DC 20037			EXAMINER LOUIE, WAI SING	
			ART UNIT 2814	PAPER NUMBER
			MAIL DATE 04/02/2008	DELIVERY MODE PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

# Office Action Summary

**Application No.**

10/586,849

**Applicant(s)**

MIKI ET AL.

**Examiner**

Wai-Sing Louie

**Art Unit**

2814

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 14 January 2008.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-23 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-23 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some \* c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-946)
- 3) ☐ Information Disclosure Statement(s) (PTO/SG/08)  
Paper No(s)/Mail Date \_\_\_\_\_
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date \_\_\_\_\_
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: \_\_\_\_\_

### DETAILED ACTION

The argument in the response to the non-final rejection is persuasive and the non-final rejection of previous office action is withdrawn and a new ground of rejection is as below.

#### *Claim Rejections - 35 USC § 103*

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1-23 are rejected under 35 U.S.C. 103(a) as being unpatentable over Chien et al. (US Pub. 2005/0026399) in view of Lee (US Pub. 2004/0099858).

With regard to claims 1-2, Chien et al. disclose a light-emitting diode (¶ [0013] and fig. 1) comprising:

- A substrate 101, and an n-type layer 1030, an multiple quantum well (MQW) active layer 1032, and a p-type layer 1036 formed on the substrate 101, the active layer 1032 being sandwiched by the n-type layer 1030 and the p-type layer 1036 (¶ [0014] and fig. 1);
- Chien et al. do not disclose the active layer 1032 comprising a thick portion and a thin portion, where the active layer 1032 has a flat lower surface and an uneven upper surface so as to form the thick portion and the thin portion. However, Lee discloses the MQW active layer 34 comprises an InGa<sub>N</sub> quantum dot well layer

34d1 and an AlGa<sub>N</sub> barrier layer 34e1 (Lee ¶ [0057] and fig. 9), where the quantum dot well layer 34d1 has a flat bottom surface and a thick portion and a thin portion top surface (fig. 9). Lee teaches the quantum dot active layer 34 could be used to adjust the energy level and the device serves as an optical amplifier (Lee ¶ [0052]). Therefore, it would have been obvious to one of ordinary skill in the art to modify Chien's device with the teaching of Lee to provide a quantum dot well layer 34d1 has a flat bottom surface and a thick portion and a thin portion top surface in order to adjust the energy level and the device serves as an optical amplifier.

With regard to claim 3, Chien et al. disclose the top surface of the active layer 1032 is covered with a thin layer of AlGa<sub>N</sub> 1034 (¶ 0014).

With regard to claim 4-13, Chien et al. modified by Lee do not disclose:

- The thick portion (quantum dots) is 15 to 50 Å;
- Has an arithmetic mean width of 10 nm or more to 100 nm or less;
- The thick portion has a width of 100 nm or more;
- The thin portion has a thickness of 15 Å or less;
- The thin portion has width of 50 nm or less;
- The different between the thick and thin portions falls within a range of 10 to 30 Å.

However, Lee discloses the size of the quantum dots can be adjusted (Lee ¶ [0054] and fig. 9). Thus, it would have been obvious to one of ordinary skill in the art to use any suitable thicknesses for the device, because it has been held that where the general

conditions of the claims are disclosed in the prior art, it is not inventive to discover the optimum or workable range by routine experimentation. See *In re Alner*, 220 F.2d 454, 105 USPQ 233, 235 (CCPA 1955).

With regard to claims 14-16, Chien et al. modified by Lee disclose the MQW has 3 times repeatedly stacked (Lee fig. 9).

With regard to claims 17-18, Chien et al. modified by Lee disclose the barrier layer is AlGa<sub>N</sub> and the active layer is InGa<sub>N</sub> (¶ [0016] and Lee [0053]), where the mole fraction  $x$  is 0 to 1 (Lee ¶ [0057]) barrier layer could be Ga<sub>N</sub>.

With regard to claims 19-20, Chien et al. modified by Lee do not disclose the barrier layer has a thickness of 70 to 500 Å. Since the applicant has not established the criticality of the thickness stated and since these thicknesses are in common use in similar devices in the art, it would have been obvious to one of ordinary skill in the art to use these values in the device. Where patentability is said to be based upon particular chosen dimension or upon another variable recited in a claim, the applicant must show that the chosen dimensions are critical. In *re Woodruff*, 919 F2d 1575, 1578, 16 USPQ2d 1934, 1936 (Fed. Cir. 1990).

With regard to claim 21, Chien et al. disclose the device has a n-electrode 109 provided on the n-type layer 1030 and a p-electrode 108 provided on the p-type layer 107 (fig. 1).

With regard to claim 22, Chien et al. disclose a flip-chip structure (fig. 1).

With respect to “has a flip-chip-type device structure” of the claimed invention does not result in a structural difference between the claimed invention and the prior art, thus claimed invention is only an art recognized suitability for an intended purpose, MPEP 2144.07 or it does not carry weight because the

limitations are either function or intended use that do not limit the claim to a particular structure, MPEP 2111.04; thus structure of Narayan is capable of performing the same function.

Regarding claim 23, Chien et al. disclose the positive electrode is Au alloy, which is reflective (¶ [0016]).

### ***Response to Arguments***

Applicant's arguments with respect to claims 1-23 have been considered but are moot in view of the new ground(s) of rejection.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Wai-Sing Louie whose telephone number is 571-272-1709. The examiner can normally be reached on 7:30 to 5:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Wael Fahmy can be reached on 571-272-1705. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Art Unit: 2814

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free)? If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Wai-Sing Louie/  
Primary Examiner, Art Unit 2814

Wsl  
March 28, 2008.